

# Embedded Intel® Architecture in Communications Appliances



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## Executive Summary

Spectacular Internet growth is driving demand for new functions that can be rapidly and cost-effectively added to the existing network infrastructure. To meet this need, developers are turning to communications appliances, network-based devices designed to perform a single function or multiple dedicated functions. Communications appliances typically provide security, storage, connectivity, and communication management services.

The increased need for network communications appliances is driven by five key requirements. These include the processing requirements for new network services, network management and packet manipulation within applications, in addition to the need to reduce system cost targets and implement software-based scalability. Intel provides a wide variety of building blocks designed to help developers of communications appliances meet all of these requirements.

Embedded Intel® Architecture (EIA) provides a single platform-based hardware design environment for all communications appliances. This means that developers can modify their designs in software to implement different appliances without re-engineering the hardware. As a result, developers using EIA gain superior flexibility and scalability for more efficient development and faster time-to-market. In addition, their product life cycles can be extended because existing hardware platforms can support ongoing software-based upgrades.

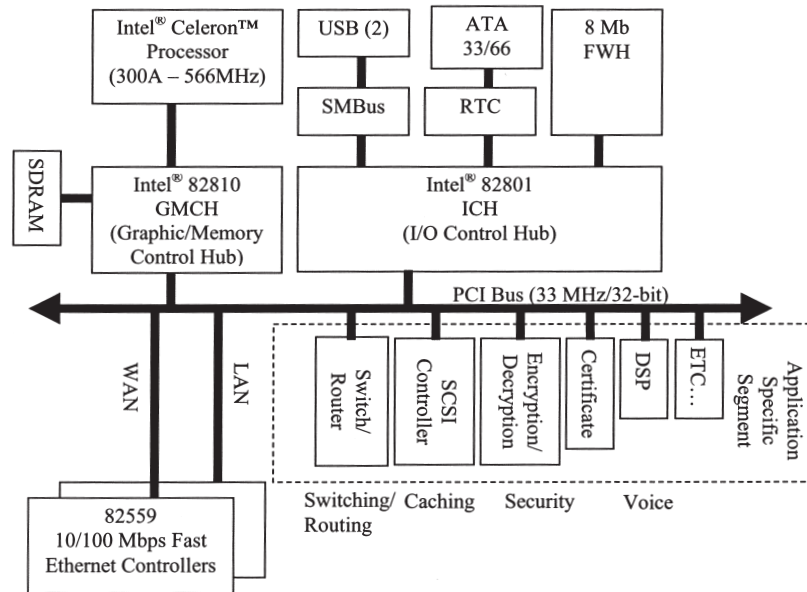
Embedded Intel Architecture supports security appliances that protect against unauthorized users, hackers and viruses. These appliances include firewalls, virtual private networks (VPNs), intrusion detection and virus detection devices. EIA also supports Voice-over-IP (VoIP) appliances, which allow for the communication of voice signals over Internet Protocol (IP) networks. In addition, Intel enables integrated storage solutions for virtually every computing environment. Storage appliances include Web caching and Network Attached Storage (NAS).

## Design Flexibility: the Embedded Intel Architecture Advantage

To offer communications appliance developers the most efficient possible design cycles and fast time-to-market, Intel provides a consistent platform architecture that can be efficiently tailored to support a variety of communications appliance applications. This fundamental hardware design scales across multiple appliance types and supports multiple price and performance targets. As a result, developers gain what Intel believes to be unmatched platform flexibility.

## A Consistent Platform for Appliances

The block diagram in Figure 1 illustrates the simplicity with which the Intel platform scales across appliance types.



**Figure 1 - Embedded Intel® Architecture Value Communications Appliance Block Diagram**

The implementation of a PCI bus in the design enables the flexible addition of a variety of application specific additions that can be used to customize the platform. It enables the design to be readily customized for a specific vertical application. For example, in the case of a cache appliance, a SCSI controller card can be added to the PCI bus. To use the hardware design for a security appliance, an encryption accelerator can be added. The other essential elements of the platform remain consistent.

By selecting the appropriate processor, the embedded Intel Architecture hardware configuration can be made to scale across entry, value and performance sub-segments. For example, an entry-level application may use an Intel® Celeron™ 300 MHz processor, while a performance application could be based on the same platform design but incorporate an Intel® Pentium® III 850 MHz processor.

## Embedded Intel Architecture Communications Appliances

Embedded Intel Architecture supports the development of appliances designed for deployment throughout the network, including:

- Storage appliances
- Management appliances
- Integrated voice and data appliances
- Security appliances
- Integrated appliances

## Typical Communications Appliance Characteristics

The typical communications appliance has the following characteristics:

- No display
- WAN/LAN connectivity
- Support for a variety of general purpose and real-time operating systems
- Specialized small form factor or 1U or 2U chassis.

## Adding Intelligence to the Network

Current trends in corporate and Internet networks are shifting from vertical network architecture toward a more intelligent, service-aware network paradigm. Intelligent management features include:

- Quality of Service (QoS) appliances that provide the required level of service to an application in order to maintain an expected quality level.
- Policy-Based Management appliances that apply rules to define resource access and usage.
- Network Monitoring appliances analyze and track ongoing network activity.

## One Design with Entry, Value and Performance-level Scalability

Figure 2 illustrates how embedded Intel Architecture can scale between different price and performance segments for a firewall appliance. The firewall is shown as a vertical line forming a boundary between the Internet (WAN) on the left side of the page and the LAN on the right side.

OEMs and developers who are primarily interested in cost and functionality with minimal processing requirements can opt for the entry and value architecture. For networks with many users and higher processing requirements for packet analysis, the performance architecture is more suitable.

## The Intel Scalable Performance Board Design

The Intel Scalable Performance Board Design Program includes design considerations that support different processor and chipset technologies in a single board. This program provides communications appliance designers with multiple price and performance options, while reducing their design and validation effort. The result can be faster time-to-market, reduced warehouse inventory costs and manufacturing costs, and minimal debug and technical support costs.

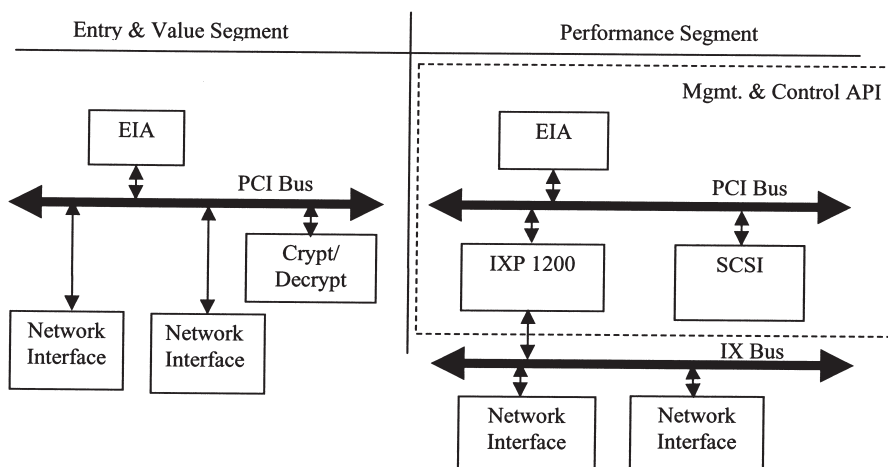
The Scalable Performance Board Design Program provides the advantage of a single board design with either the Intel® 440BX chipset or Intel® 810 chipset. Boards based on these designs can be configured at build time with Intel Celeron or Intel Pentium III processors, without other board changes. In addition, these board designs meet a variety of customer requirements by supporting application-specific software and peripherals, while maintaining compatibility with operating systems, BIOS, and peripheral interfaces.

## Reference Platforms

To further speed time-to-market, Intel provides reference designs at no charge. Designs are available for solutions based on the Intel 440BX and 810 chipsets, with schematics available in OrCAD\* and .pdf formats. These reference designs provide a proven design foundation that enables developers to focus their core resources on providing value-added services. These design guidelines are available on Intel's developer Site at [developer.intel.com/platforms/applied/comm/index.htm#configs](http://developer.intel.com/platforms/applied/comm/index.htm#configs)

## Third-party Building Blocks

From BIOS and operating systems, to application software and board-level platform solutions, Intel communications appliance reference platforms are supported by a variety of third-party building blocks. Following is a partial list of available building blocks:



**Figure 2 - Value Segment/Performance Segment Firewall Architecture Using Embedded Intel Architecture (EIA)**

- Embedded BIOS\* and tools - General Software
- eSoft\* redphish\* software for e-mail, firewall, storage, DHCP, and other services, with integrated Linux operating system
- Technauts\* eServer\* for e-mail, firewall, storage, DHP, and other services, with RedHat\* Linux and high-availability options
- CrosStor\* NAS for Unix\* and Windows\* clients, with support for RAID levels 0, 1, 4, and 5 and incremental backup capability
- LinuxWorks\* BlueCat\* Linux with development tools
- Microsoft\* Windows\* NT Embedded and Win32 programming model
- Board-level solutions from Force Computers\*, ITOX\*, Teknor\*, Trenton Technology\*, and Win Enterprises\*.

## Intel® Internet Exchange Architecture

The Intel® Internet Exchange architecture (IXA), as shown in Figure 3, provides a consistent framework for OEMs and independent software vendors to quickly deploy new networking and communications services and develop differentiated networking products that deliver scalable performance with reduced total cost of ownership. Intel IXA includes end-to-end development solutions and building blocks that enable developers to create solutions for the entire Open System Interconnectivity (OSI) stack.

Embedded Intel Architecture delivers solutions that meet the performance requirements of the Application Services Layer of the OSI Model. By incorporating scalable embedded Intel Architecture components and software within Intel IXA, Intel is delivering a flexible top-to-bottom architecture that delivers high performance, scalability, code compatibility and programmability that enables faster and more cost effective software-based product differentiation.

## Conclusion

Communications appliances provide simple and cost-effective ways to add intelligence and functionality to networks. Designs based on embedded Intel Architecture provide flexibility and scalability that maximize rapid deployment and cost efficiency for developers of communications appliances. With EIA-based designs, and readily available hardware and software building blocks from Intel and a growing list of third-party providers, developers can shave months off their product design cycle.

Open Intel Architecture enables scalable designs that provide the flexibility OEMs and developers need to stay on the leading edge of today's rapidly evolving communications market segment, without reinventing the wheel.

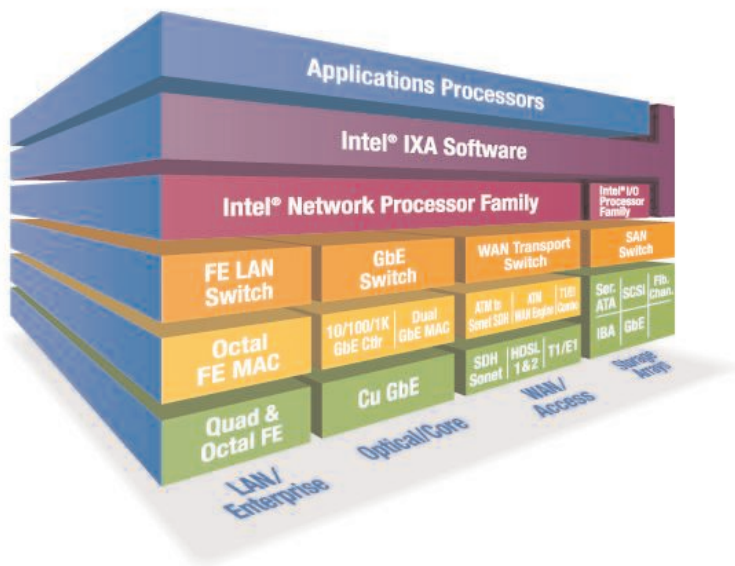


Figure 3 - Intel® Internet Exchange Architecture

## For More Information

For more information on Intel's Communications Reference Designs, including block diagrams and downloadable schematics, visit Intel's Developer Site:  
[developer.intel.com/platforms/applied/comm](http://developer.intel.com/platforms/applied/comm)

For more information on Intel Internet Exchange Architecture solutions, visit the Intel IXA Web site:  
[www.intel.com/ixa](http://www.intel.com/ixa)

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